

The Strategic Plan
For The Restoration Of
Shad and Alewives
To The Kennebec River Above Augusta

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The goal of the Kennebec River Anadromous Fish Restoration Plan is:

"To restore the alewife and shad resources to their historical range in the Kennebec River System."

The following objectives addressing this goal have been developed. They are:

- I. To achieve an annual production of 6.0 million alewives above Augusta.
- II. To achieve an annual production of 725,000 shad above Augusta.

These objectives are based on the projected potential of the Kennebec River from the Augusta dam to the lower dam in Madison including the Sebasticook River, Sandy River, Seven Mile Stream, and Wesserunsett Stream. A more detailed analysis by river segment or tributary can be found in Tables 1 and 2.

The strategy developed to meet these objectives involve restoration planned in two phases.

They are:

1. Phase I- (January 1, 1986 through December 31, 1998)

Require upstream and downstream fish passage facilities at the Edwards Dam (FERC #2389). The upstream fish passage facilities need to be capable of allowing the collection/sorting/transportation of fish in addition to allowing passage. Restoration of alewives will be initiated to selected lakes and ponds in the Seven Mile Stream, Sebasticook River, and Wesserunsett Stream drainages. During Phase I, restoration of alewives will be accomplished by trap and truck. In the event that a fish passage/sorting/transportation facility is not completed by May, 1986 at the Edwards Dam, alewives will be transported from out-of-basin.

Restoration of shad will be initiated to the river segment between the Edwards Dam and the Lockwood Dam. This will be accomplished by requesting a passage facility at the Edwards Dam which will allow the sorting and passage of shad. In the event that a fish passage and sorting facility is not functional by May, 1986, an effort will be made to capture shad in the lower Kennebec River estuary and transport them to the river segment above the Edwards Dam. In addition, shad will be transported from out-of-basin, if available.

Trucking of shad from the Edwards Dam to upriver segments will be initiated five years prior to passage being provided to that segment.

2. Phase II

Starting in 1999, fish passage will be required at all mainstem dams on the Kennebec River up to the Abenaki Dam (FERC #2364) in Madison, on the mainstem dams on the Sebasticook River up to the confluence of the east and west branches, and at the Madison Electric Works Dam on the Sandy River. Passage will be required at one year intervals proceeding upstream with the exceptions that passage will be required concurrently at the Lockwood Dam (FERC #2574), Winslow Dam (FERC #2322), Fort Halifax Dam (FERC #2552), and the proposed Benton Falls Project (FERC #5073). The required fish passage in these dams is mainly for the benefit of American shad and Atlantic salmon.

The feasibility of truck stocking alewives as a substitute for fish passage facilities will be evaluated during Phase I. It may be decided to continue the truck stocking of alewives during Phase II.

The introduction of alewives into the following lakes during Phase II is dependent on the outcome of a joint study by the Maine Department of Marine Resources and the Maine Department of Inland Fisheries and Wildlife: Great Moose Lake, Spectacle Pond, China Lake, Big Indian Pond, Little Indian Pond, Wassokeag Lake, Clearwater Pond, and Norcross Pond. This study is for the purpose of assessing the interactions of alewives with smelts and salmonids. Based upon the results of these studies, a cooperative decision will be made regarding future alewife introductions into the above listed waters.

Table 1: Potential Alewife Production in the Kennebec River above Augusta.

| Ponded Area | Surface Acreage | Total Fish ¹ Production (235/Acre) | Allowable ² Harvest (200/Acre) | Spawning ³ Escapement (35/Acre) |
|----------------------------|-----------------|---|---|--|
| <u>Seven Mile Stream</u> | | | | |
| Webber Pond | 1252 | 294,220 | 250,400 | 43,820 |
| Spectacle Pond | 139 | 32,665 | 27,800 | 4,865 |
| Three Mile Pond | 1077 | 253,095 | 215,400 | 37,695 |
| Three Cornered Pond | 195 | 45,825 | 39,000 | 6,825 |
| TOTAL | 2663 | 625,805 | 532,600 | 93,205 |
| <u>Sebasticook River</u> | | | | |
| Douglas Pond | 525 | 123,375 | 105,000 | 18,375 |
| China Lake | 3922 | 921,670 | 784,400 | 137,270 |
| Pattee Pond | 712 | 167,320 | 142,400 | 24,920 |
| Lovejoy Pond | 324 | 76,140 | 64,800 | 11,340 |
| Unity Pond | 2528 | 594,080 | 505,600 | 88,480 |
| Pleasant Lake | 768 | 180,480 | 153,600 | 26,880 |
| Great Moose Lake | 3584 | 842,240 | 716,800 | 125,440 |
| Big Indian Pond | 990 | 232,650 | 198,000 | 34,650 |
| Little Indian Pond | 143 | 33,605 | 28,600 | 5,005 |
| Sebasticook Lake | 4288 | 1,007,680 | 857,600 | 150,080 |
| Wassookeag Lake | 1062 | 249,570 | 212,400 | 37,170 |
| Plymouth Pond | 480 | 112,800 | 96,000 | 16,800 |
| TOTAL | 19,326 | 4,541,610 | 3,865,200 | 676,410 |
| <u>Wesserunsett Stream</u> | | | | |
| Hayden Lake | 1446 | 339,810 | 289,200 | 50,610 |
| <u>Sandy River</u> | | | | |
| Norcross Pond | 122 | 28,670 | 24,400 | 4,270 |
| Clearwater Pond | 751 | 176,485 | 150,200 | 26,285 |
| North Pond | 170 | 39,950 | 34,000 | 5,950 |
| Parker Pond | 128 | 30,080 | 25,600 | 4,480 |
| TOTAL | 1171 | 275,185 | 234,200 | 40,985 |
| Grand Total ⁴ | 24,606 | 5,782,410 | 4,921,200 | 861,210 |

¹Based on an annual commercial yield of 100 pounds per surface acre and an escapement rate of 15%. Average weight of .5 pound/fish

²Assumes 100% fish passage efficiency (upstream and downstream)

³The escapement rate of 35 adult alewives per acre refers to the escapement needed into the pond or lake. Higher rates would be needed downriver depending on the number of dams and fish passage efficiency.

⁴Assumes there will be 100% survival of downstream migrating juvenile alewives. A 10% mortality at each hydroelectric facility (with downstream passage) would reduce the potential total production from 5,683,641 alewives to 4,047,800

Table 2: Potential shad production in the Kennebec River based on water surface acreage (2.3 shad/100 sq. yds.)

| <u>River Segment</u> | <u>Surface Acreage (yd.²)</u> | <u>Potential Shad Production¹</u> |
|---|--|--|
| Mainstem Augusta Dam to Milstar Dam, Waterville | 6,872,800 | 158,074 |
| Sebasticook River Halifax Dam to Confluence of East and West Branches | 6,757,080 | 155,413 |
| Mainstem Kennebec River Scott Paper Company Dam, Waterville to Shawmut Dam, Fairfield | 2,531,361 | 58,221 |
| Mainstem Kennebec River Shawmut Dam, Fairfield to Central Maine Power Dam, Skowhegan | 6,125,167 | 140,879 |
| Mainstem Kennebec River Skowhegan Dam to Madison | 4,961,583 | 114,116 |
| Sandy River Mouth to Route #4, Bridge in Farrington | 4,262,250 | 98,032 |
| TOTAL: | <u>31,510,241</u> | <u>724,735</u> |

¹ Assumes that there will be 100% survival of downstream migrating juvenile shad. A 10% mortality at each hydroelectric facility (with downstream passage) would reduce the total production from 724,735 to 519,759.

Appendix 1: Fish Passage Requirements for Dams on the Mainstem of Kennebec River and Major Tributaries.

| Dam | Miles Above Tidewater | Gross Static Head | PASSAGE REQUIREMENTS | |
|---|--------------------------|----------------------|----------------------|----------------------|
| | | | Shad ¹ | Alewife ² |
| Kennebec River - Mainstem | | | | |
| 1. Edwards Dam Augusta | 0 | 17 | 385,216 | 1,547,879 |
| 2. Milstar Dam Waterville | 18 | 21 | 228,471 | 164,640 |
| 3. T & A Mills Dam Scott Paper Co. Waterville | 20 | 23 | 205,625 | 148,175 |
| 4. Shawmut Dam CMP Fairfield | 26 | 24 | 176,514 | 133,358 |
| 5. Weston Dam CMP Skowhegan | 38 | 35 | 106,074 | 50,600 |
| Sebasticook River | | | | |
| 31 Fort Halifax Dam CMP Winslow | 18 | 30 | 77,707 | 1,135,711 |
| 39a Benton Falls Dam Benton Falls | 26 | 31 | 57,531 | 767,267 |
| 39 Burnham Hydro Burnham | 40 | 33 | 22,224 | 599,567 |
| Sandy River | | | | |
| 53 Madison Electric Norridgewock | 52 | 17 | 41,825 | 45,539 |

¹ Shad passage requirements are based on a 50% escapement rate and a 90% fish passage efficiency at each fishway. The 10% loss was allocated to spawning requirements of the impoundment below the fishway.

² Alewife passage requirements are based on an escapement rate of 35 adult alewives per acre of spawning habitat. A 90% fish passage efficiency was assumed at each fishway.

Appendix 2: Obstructions on the Kennebec River from Augusta to Moosehead Lake.

| Dam Number | Project Name | Gross Head | Location | Owner | License Expiration Date | Generating Capacity (kw) |
|------------|-----------------------------|------------|-------------------|----------------------------------|-------------------------------|-----------------------------|
| 1 | Edward (FERC #2389) | 17 | Augusta | Augusta Dev. Corporation | 12/31/1993 | 3,500 |
| 2 | Lockwood (FERC #2574) | 21 | Wtvl/Winslow | Milstar Manu- facturing Corp. | 04/30/2004 | 6,550 |
| 3 | Winslow (FERC #2611) | 21 | Wtvl/Winslow | Scott Paper | 12/31/1993 | 3,730 |
| 4 | Shawmut (FERC #2322) | 23 | Fairfield | Central Maine Power Co. | 01/31/2021 | 8,650 |
| 5 | Weston (FERC #2325) | 35 | Skowhegan | Central Maine Power Co. | 12/31/1993 | 12,000 |
| 6 | Abenaki (FERC #2364) | 43 | Madison | Madison Paper Industries | 04/30/2004 | 5,400 |
| 7 | Anson (FERC #2365) | 21 | Madison | Madison Paper Industries | 12/31/1993 | 6,000 |
| 8 | Williams (FERC #2335) | 48 | Solon/Embden | Central Maine Power Co. | 12/31/1987 | 13,000 |
| 9 | Wyman (FERC #2329) | 142 | Moscow | Central Maine Power Co. | 12/31/1993 | 72,000 |
| 10 | Harris (FERC #2142) | 159 | T1 R6 | Central Maine Power Co. | 12/31/2001 | 76,000 |
| 11 | Moosehead Lake (FERC #2671) | 9.5 | Big Squaw/Taunton | Kennebec Water Power | 12/31/1993 | Storage |
| 12 | West Outlet Moosehead Lake | 6.5 | T1 R1 | Kennebec Water Power | | Storage |

| Dam Number | Location | Owner | Head | Condition |
|------------|---|-----------------------------------|-------|--|
| 22 | Seven Mile Stream Vassalboro | NA | 3' | Breached |
| 23 | Seven Mile Stream Vassalboro | NA | 11' | Breached |
| 24 | Webber Pond Outlet | Vassalboro | 7' | Good |
| 24a | Three Mile Lake Outlet | NA Sebasticook River | 3' | Breached |
| 31 | Fort Halifax (FERC #2552) Sebasticook River Winslow | Central Maine Power | 22.5' | 1,500 kw License expires 12/31/93 |
| 32 | China Lake Outlet Vassalboro | Ladd Paper Co. | 9' | Fair |
| 33 | China Lake Outlet Vassalboro | American Woolen Co. | 16' | |
| 34 | China Lake Outlet Vassalboro | H. Brewer | 15' | |
| 35 | China Lake Outlet Vassalboro | NA | 4' | |
| 36 | China Lake Outlet Vassalboro | Masse & Son | 13' | |
| 37 | China Lake Outlet Vassalboro | Town of Vassalboro | 7' | |
| 38 | Pattee Pond Brook Winslow | NA | | Breached |
| 38a | Lovejoy Pond Outlet Albion | Clarence Chalmers | 15' | Good |
| 39 | Sebasticook River Burnham | Burnham Hydro Electric (Keddy) | 27' | |
| 39a | Sebasticook River Benton Falls | Everett E. Whitman | 31' | Licensed; construc- tion was not ini- tiated as of 3/25/85 |
| 40 | East Branch Sebasticook River Newport | Guilford Industries | 13' | Preliminary permit |
| 41 | Sebasticook Lake Newport | Town of Newport | 8' | Good |

| Dam Number | Location | Owner | Head | Condition |
|------------|---|--------------------------------|-------|-------------------------------|
| 41a | Pleasant Lake Outlet Stetson | NA | 5' | Poor |
| 41b | East Branch Sebasticoock River Corinna | Eastern Woolen Mills | 14' | Good |
| 41c | East Branch Sebasticoock River Corinna | Eastern Woolen Mills | 14' | Good |
| 41d | East Branch Sebasticoock River Corinna | Eastern Woolen Mills | 14' | Good |
| 41e | East Branch Sebasticoock River Corinna | Eastern Woolen Mills | 12' | Good |
| 41f | Wassookeag Lake Dexter | Amos Abbott Co. | 8.8' | Good |
| 42 | Pioneer Dam (FERC #8736) West Branch Sebasticoock River Pittsfield | Chris Anthony | 10' | 300 kw License Exempted |
| 43 | Waverly Ave (FERC #4293) Sebasticoock River Pittsfield | Chris Anthony | 15' | 700kw License Exempted. |
| 43a | Indian Stream St. Albans | Harold Bishop | 8-10' | Fair |
| 43ab | Indian Stream St. Albans | | 6-8' | Fair |
| 43b | Big Indian Pond Outlet St. Albans | Town of St. Albans | 9' | Good |
| 43c | Madawaska Pond Palmyra | Inland Fisheries & Wildlife | 4' | Good |
| 43d | Whites Pond Palmyra | NA | 3-4' | Poor |
| 44 | West Branch Sebasticoock River Hartland | Irving Tanning Co. | 8' | Fair |
| 45 | Great Moose Pond Hartland | Town of Hartland | 17' | Fair |
| 46 | Plymouth Pond Plymouth | Plymouth | 9' | Good |

| Dam Number | Location | Owner | Head | Condition |
|------------|--|---------------------------|-------|---|
| 47 | Unity Pond Unity | | 3' | Not Present |
| 49 | Malbons Mills, main stem Wesserunsett Stream Skowhegan | NA | 15' | Poor, log crib; breached still impassable at most water levels |
| 50 | Lower West Branch Wesserunsett Stream | NA | 5-7' | Dam approx. 2' in head & fall 5' in head; falls passable. |
| 51 | Lower West Branch Wesserunsett Stream | NA | 8-10' | Fair |
| 52 | Hayden Lake Outlet | Town of Madison | 6' | Good |
| 53 | Sandy River Norridgewock | Madison Electric Works | 17' | Good |
| 53a | Clearwater Pond Industry | NA | 3-4' | Good |
| 53b | Little Norridgewock Stream, Chesterville | IF&W | 6-8' | Good |